

# **Decision-making for active living infrastructure in new communities: a qualitative study in England**

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# ABSTRACT

## Background

Urban design can influence population levels of physical activity and subsequent health impacts. This qualitative study investigates local level decision-making for 'active living' infrastructure (ALI) - walking and cycling infrastructure and open spaces in new communities.

## Methods

Thirty-five semi-structured interviews with stakeholders, and limited ethnographic observations, were conducted with local government and private sector stakeholders including urban and transport planners, public health practitioners, elected councillors and developers. Interview transcripts were coded and analysed thematically.

## Results

Public health practitioners in local government could act as knowledge brokers and leaders to motivate non-health stakeholders such as urban and transport planners to consider health when designing and building new communities. They needed to engage at the earliest stages and be adequately resourced to build relationships across sectors, supporting non-health outcomes such as tackling congestion which often had greater political traction. 'Evidence' for decision-making identified problems (going beyond health), informed solutions, and also justified decisions post hoc, although case study examples were not always convincing if not considered contextually relevant.

## Conclusion

We have developed a conceptual model with three factors needed to bridge the gap between evidence and ALI being built: influential public health practitioners; supportive policies in non-health sectors; and adequate resources.

# INTRODUCTION

The social determinants of health are shaped by policies and decisions in non-health sectors. National and international policies increasingly acknowledge the impact that the built environment can have on population health through physical activity,[1–3] recognising the role that non-health sectors such as urban and transport planning can play in producing activity-promoting environments.[4,5] Newly built communities can serve as ideal test sites for this public health strategy.

Evidence-based policy and decision-making is promoted within the health sector. However, urban designs are often locally developed by decisions-makers outside the health remit and broader concepts of ‘evidence’ than scientific research are involved.[6–9] The role of scientific evidence in influencing policy and practice has been widely researched, [10–13] but there remain limitations in understanding the facilitators and barriers to decision-making for healthy outcomes in traditionally non-health sectors.[14] Communication and co-production of research is promoted to improve the relevance of evidence for uptake for better decision-making,[13,14] but few studies have investigated the use of evidence, alongside other influences, at the local level.[15,16]

In England there is substantial political pressure to increase house building,[17] and new communities with thousands of new homes are being built, designed and financed by developers (mostly from the private sector), guided by local planning policies. Decision-making for walking and cycling infrastructure and open spaces (‘Active Living Infrastructure’ (ALI)) in large developments ultimately lies with locally elected councillors, who grant planning permission. Local government urban planners are highly influential as they develop policy, negotiate with developers and advise councillors. Public health practitioners also work in local government, supporting the ‘health in all policies’[18] agenda.

This study sought to understand how public health can influence decision-making for ALI in new communities. The research was guided by three main questions: (1) How does evidence, information or data influence decisions relating to ALI and what else is influential? (2) What leads to changes in plans of new residential developments or towns which affect walkability, cycling or open spaces? (3) What evidence or data could support more effective planning of ALI?

# METHOD

## Setting

Three local government areas of England (two unitary local authorities (LAs) and one with two-tier LAs: district and county) were purposively sampled, each with a large new housing development being planned and/or built (thousands of new homes plus local commercial centres). Settings included rural, peri-urban and urban areas with developments adjacent to existing urban areas, villages or involved urban regeneration. All three LAs were also chosen as they have a public health practitioner dedicated to urban planning, existing high levels of ALI, or both, and were therefore considered information-rich sample settings.[19] The locations are not identified to ensure anonymity of study participants who come from small stakeholder groupings.

## Participants

Interview participants were purposively sampled across influential stakeholder groups for ALI. Snowball sampling of recommended knowledgeable expert stakeholders was conducted through initial contacts from local government and the private sector to arrive at a diverse sample of individuals from urban and transport planning, public health, environment, elected councillors, cycling groups and developers. In total 40 stakeholders were interviewed during 35 interviews between October 2017 and June 2018 (Table I). Limited ethnographic observations were also conducted during two urban planning meetings in two areas involving private sector developers, LA urban planners, public health practitioners, environment professionals, and others to inform the analysis and aid triangulation.

## Data collection

Initial scoping discussions were conducted with 13 key stakeholders from the public and private sectors in transport, urban planning and public health (7 local government, 1 central government, 5 non-government). These helped with developing the interview guide (see supplementary material) to enable practitioner-relevant research.

Qualitative interviews were semi-structured and allowed flexibility to explore emerging issues. They aimed to understand how different stakeholders used evidence, information and data to influence decision-making for ALI (explained to participants as walking or cycling infrastructure or open spaces which could enable physical activity), and when and how they were involved in the planning and design process. We did not want to restrict definitions of 'evidence' and invited participants to

interpret it as they saw fit. The topic guide was initially piloted with two participants to check relevance across different sectors (urban planning and public health). All interviewees provided written informed consent.

The 35 interviews were conducted by ALG either face-to-face (68%, 81% of which were at the participants' offices, the remainder at ALG's office or a public café), or by telephone (33%) and took an average of 51 minutes each (range 21 – 97 minutes). All except one (at the participant's request) were audio-recorded and transcribed verbatim. Notes were made for the non-recorded interview which were checked and edited by the participant. Field notes were made during ethnographic observations.

## Analysis

We conducted thematic analysis [19] to allow for emergent, unanticipated issues to arise and to identify and analyse patterns in the data using a rigorous process of data familiarisation, coding and theme development[20]. Interview transcripts and notes were coded by ALG and two interviews were coded independently by CG, supported by NVivo 12,[21] allowing for reflection on and discussion of the codes. Theme development was conducted by ALG, and iteratively discussed and revised with CG to develop the themes and interpretation.

## RESULTS

Stakeholders used a variety of 'evidence' to influence designs of ALI: to identify a problem; inform solutions; or justify decisions post hoc. Public health practitioners could be influential across non-health sectors. Barriers to ALI involved political, organisational and structural issues.

### Problem and solution evidence

#### Evidence of a problem – needs assessment beyond health

Stakeholders were influenced indirectly by academic research which informed national dialogue and organisational concern about levels of physical inactivity and health impacts. Participants generally understood that there is strong evidence of health benefits of physical activity, which they described as 'common sense'. 'Health Impact Assessments'[22] conducted by developers were often not required in local planning policy, or were reportedly weak due to lack of skills and enforcement mechanisms.

Overall stakeholders tended to prioritise more tangible ALI-related issues such as air quality, congestion and car parking. They used local (qualitative and quantitative) data extending beyond

the health sector, for example combining local childhood obesity statistics with spatial data of quality assessment of parks or traffic congestion. Public opinion was also influential. Demonstrating local problems increased political motivation of councillors to act, but restricted funding limited monitoring and the ability to use objectively measured data.

## Evidence for a solution – knowing what works

Evidence for solutions to identified problems or needs was available within guidance material, based on academic evidence from evaluations and case studies, for example from Public Health England and the Town and Country Planning Association.[23,24] This was particularly accessed by urban planners, developers and public health practitioners who understood the value of ALI for health and wanted workable solutions. However, some developers complained that health evidence struggled to reach non-health sectors and one transport planner described guidance for cycling infrastructure as “sporadic” and “ad hoc”.

Public health practitioners were most likely to access research evidence, whereas councillors rarely did this, admitting it was difficult accessing information and, like other participants, often simply used internet search engines such as Google. A handful of LA and private urban planners had directly engaged with academics to create evidence of effectiveness of ALI through evaluating new housing developments, whilst some cycling stakeholders and police participants engaged with academics to increase their knowledge of best practice.

## Retrospective evidence - justifying solutions already made

Sometimes health benefits of ALI were used to justify decisions post hoc. For example transport planners, who prioritised tackling congestion, acknowledged health benefits of walking and cycling infrastructure to support such investment over roads; developers justified spending on greenspaces to investors with research about impact on house prices,[25] and sometimes used health evidence to justify less road construction which was expensive, affecting profits.

## Resistance, power and relationships

### Limitations of evidence

A lack of clear evidence of ALI impacts made it difficult for public health practitioners and developers to know what to promote. Urban planners focussed on outputs rather than outcomes, for example that the construction of cycle routes was completed rather than whether routes would be well used. Councillors were reluctant to try new designs based on examples from other places which did not appear contextually-relevant, and were fearful of seemingly wasting resources on apparently ‘risky’

solutions which could be politically damaging. This was particularly a problem where good-practice demanded a step change in quality from the status quo and opposition from car drivers or restricting house building were concerns. Developers were also reluctant to invest in walking and cycling infrastructure in areas with apparent low local demand because they did not believe it would increase house prices.

Economic effects of ALI were rarely considered because financial savings from health benefits of ALI did not directly affect local government budgets, therefore many councillors were sceptical of its value. Also, cost benefit analysis was difficult to use in the planning system because urban planners negotiate financial contributions from developers, without monetising potential benefits.

### Influential individuals

Public health stakeholders could be influential, firstly as knowledge brokers sharing evidence about the health effects of ALI and providing practical solutions, but potentially also acting as leaders, building strong relationships to inspire decision-makers to raise up health in their consciousness and motivate them to argue for ALI. Where public health practitioners had a defined planning role, urban planners described them as “passionate” and a “force of nature” and participants explained that they broke down silos to motivate stakeholders across sectors, creating mutual benefits with other sectors’ outcomes, including air quality, noise, flooding, biodiversity, congestion, social cohesion, crime and house prices.

Urban planners met most regularly with developers and negotiated with multiple stakeholders who were said to push their own agendas. ALI could be difficult to achieve because of other demands and no defined minimum standards but urban planners could influence designs if knowledgeable and motivated, however they lacked specialist health understanding.

### The value of early involvement

Most stakeholders understood that early engagement with developers, before planning applications were submitted, provided the greatest opportunity to influence ALI designs and some were frustrated that LA urban planners involved them too late. It therefore appeared that LA urban planners needed to either understand the health impacts of a scheme themselves, which they struggled with, or be able to bring in other sources of knowledge and influence via public health practitioners.

## Barriers to innovation and change

### Limited by policies

Stakeholders discussed a lack of national level standards and policies for ALI, which restricted quality. Participants said that local policies generally supported healthy developments but wording was vague without specifications for walking and cycling infrastructure and only quantities of open space required per population, not quality. Stakeholders described tensions between ALI and competing demands, including national planning and transport policies which promoted house building[26] and transport assessment methods which focussed on road traffic analysis rather than “fluffy active travel stuff” (LA transport planner). It seemed that local policies were important to set minimum standards for developments which LA urban planners could then use to hold developers to account. Without defined policies stakeholders said developers would only provide the minimum that they could get away with, unless they saw financial value in doing more.

Participants talked about difficulties in producing policies which risked being unpopular to car-drivers as councillors feared public backlash if congestion increased as a result of new development. So whilst some planners and developers wanted to be innovative they were restricted by local policies, for example, specifying a minimum number of car parking spaces per house.

### Watering down good designs

Even when ALI was initially well designed participants described situations where plans could later change because minimum designs standards were lacking – developers might try to reduce costs, plans were not enforced, or concerns about crime led to watering down designs. Sometimes the impracticality of plans became apparent too late, for example discovering that a football pitch was located on a slope, resulting in its purpose being changed.

Safety auditors often recommended changes to walking and cycling infrastructure because of safety concerns and developers agreed to these changes to improve their chances of receiving planning permission and to ensure the LA would take on long-term management of roads. Whilst public health practitioners also considered accident risks, they were more likely to take an holistic view. Finally, some participants were frustrated by schemes where walking and cycling routes were built after all houses were completed, apparently for cost reasons, because people then got “into bad habits” (Greenspaces stakeholder) and therefore were less likely to use them.



## Not enough resources

Most participants were concerned that LA urban planners were under resourced to engage with the right people, learn about best practice, and ensure that health was adequately considered. Limited resources for monitoring and evaluation also restricted learning about effectiveness. Some stakeholders wanted to work more with public health, including master-developers, to get feedback on designs (in contrast to volume housebuilders whom participants said had no concern for health). However most LAs in England did not have a public health practitioner dedicated to urban planning.

# DISCUSSION

## Main findings of this study

We found that public health practitioners in local government could act as knowledge brokers and leaders, if engaged early enough, to motivate non-health stakeholders to consider health when designing and building new communities. ‘Evidence’ was found to be used to identify problems, inform solutions (noting that case study examples were often not considered contextually relevant), or justify decisions post hoc. However, it was influential public health practitioners who, if adequately resourced and with supportive policy environments, could share knowledge and inspire others not only to enable more ALI, but also to ensure that it was attractive, convenient, safe and functional.[4,5] This is summarised in Figure 1 as an ‘evidence-output implementation gap’.

## What is already known on this topic

Findings about the types of evidence used reflect previous studies: scientific evidence hierarchies are unlikely to be considered in non-health disciplines,[8,27] and local evidence of effectiveness and public opinion is highly valued[15], often for broad outcomes of interest including congestion and air quality; if academic research is used then its external validity is important in determining whether a solution is applicable to decision-makers’ local contexts.[6] There are demands for improving the quality of evidence around effectiveness of ALI for population physical activity[4,5] which could be supported by wider monitoring and evaluation in LAs. A lack of research in this area has been explained previously as an ‘inverse evidence law’[28] whereby the least amount is known about interventions which are most likely to influence whole populations, and previous research has highlighted challenges in creating evidence to inform practice.[29]

## What this study adds

Knowledge exchange literature advocates for knowledge brokers to translate research into policy and practice, enabling joint working for mutually beneficial outcomes and ‘learning to speak the

same language’.[30–33] We found that public health practitioners in local government can adopt knowledge broker roles to promote ALI. However, scientific evidence alone is insufficient to influence policy and practice in local government [34] and political feasibility must be considered.[8] Research has demonstrated decision-making to be non-linear and influenced by multiple factors.[30] This study also echoes findings from policy theory, recognising the importance of actors, institutions, networks, ideas/beliefs, policy context, and events,[35] and specifically relationships and leadership in local government.[9,14] Kingdon described three streams of problem, policy and politics that needed to coincide to provide a ‘window of opportunity’ for change[36] and a similar analogy was seen for decision-making in this study: problem ‘evidence’ needs to be identified, policies and solutions made available, and politics supportive (aided by influential individuals) for healthy ALI. The advocacy coalition framework[37] also shares relevance with our findings, particularly for cycling infrastructure where opposing ‘coalitions’ of pro- and anti-cycling groups can be at loggerheads. Central to Kingdon’s framework is the ‘policy entrepreneur’ to instigate change, echoed in our study in a role shared between urban planners acting as negotiators and public health practitioners acting as knowledge brokers and charismatic leaders[38]. Further understanding is needed about the nuances underlying these ‘broker’, ‘champion’ or ‘policy entrepreneur’ roles, and what makes them influential or effective to practice the ‘art’, not only the science, of public health.[39]

We developed a conceptual model with three factors needed to fill the ‘evidence-output implementation gap’ (Figure 1) for ‘evidence’ to support ALI: influential individuals such as public health practitioners in local government who can engage early with developers to improve designs and avoid later dilution; national and local urban planning and transport sector policies and standards which enable ALI; and adequate resources for collaborative working and learning.

This study highlighted a lack of contextually-specific examples available to local decision-makers, which reduced political acceptability of change for ALI. Although complex interventions will not follow a formula,[8] examples from similar places are more persuasive to local level decision-makers. Figure 1 includes a dotted line to show a translational framework approach[40] where greater monitoring and evaluation of ALI at scale could strengthen the evidence-base. This requires motivational leadership and collaboration across LAs to change attitudes and emphasise effectiveness of ALI outcomes over potentially ineffectual outputs.

## Limitations of this study

LAs are heterogeneous and focussing on three areas of England may have missed insights from other contexts. ALG has a background in public health, civil engineering and local government which helped to build rapport with many study participants. However, participants came from many

sectors therefore ALG had less experience in some areas. Snowball sampling following the recommendation of key stakeholders might have led to likeminded participants, but it enabled access to important stakeholders, some of whom were unanticipated. New communities were at different stages of development but limited timeframes meant it was not feasible to follow decision-making through from conception to construction.

## CONCLUSION

Public health practitioners can help bridge the 'evidence-output implementation gap' for quality ALI, if engaged early, acting as influential knowledge brokers and leaders to motivate non-health stakeholders, such as urban and transport planners. Supportive policies, greater resourcing and increased monitoring for contextually-relevant examples would also help.

## FUNDING

This work was supported by the British Heart Foundation, Cancer Research UK, Economic and Social Research Council, Medical Research Council, the National Institute for Health Research, and the Wellcome Trust, under the auspices of the UK Clinical Research Collaboration [grant numbers 087636/Z/08/Z, ES/G007462/1, MR/K023187/1 to ALG and DO]; and the National Institute for Health Research [grant number 16/137/34 to LF].

ALG and DO are supported by the Medical Research Council (MC\_UU\_12015/6) and Centre for Diet and Activity Research (CEDAR), a UKCRC Public Health Research Centre of Excellence. LF is supported by the NIHR Global Health Research Group and Network on Diet and Activity.

No funder had any role in the study design; data collection, analysis, or interpretation; in the writing of the report; or in the decision to submit the article for publication.

## ACKNOWLEDGEMENTS

The authors thank all anonymous participants involved in this study. We gratefully acknowledge feedback on the manuscript by Dr James Woodcock and Dr Oliver Mytton.

## Ethical approval

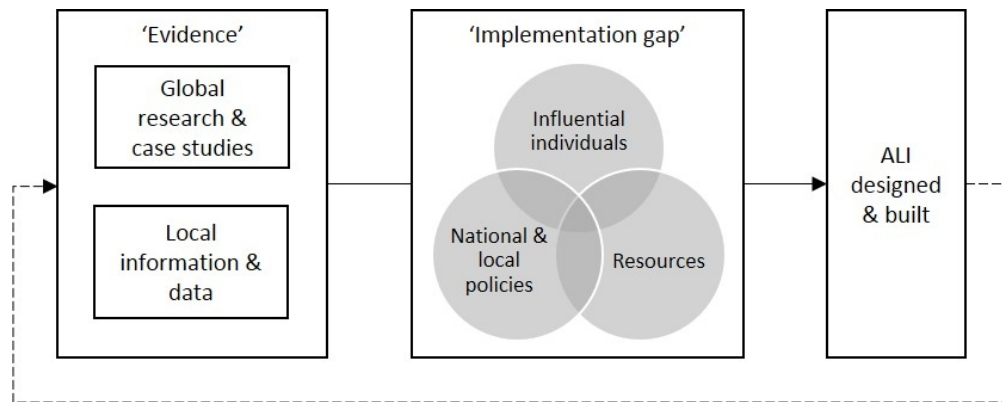
Ethical approval for this study was received from the University of Cambridge School of the Humanities and Social Sciences on 5 August 2017. University of Cambridge sponsorship reference number: RG71157.

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The 'evidence-output implementation gap'

141x56mm (150 x 150 DPI)



Table I - Interview participant role in each local government area

<b>Role</b>	<b>Area 1</b>	<b>Area 2</b>	<b>Area 3</b>	<b>Total</b>
Councillors	1	1	1	3
Public health practitioners	1	1	1	3
Greenspaces stakeholders (including for parks, landscaping and footpaths)	2	1	2	5
Cycling stakeholders	2	0	2	4
LA urban planners	3	3	3	9
Private urban planners (including from master-planning developers and volume housebuilders)	4	2	1	7
LA transport planners	2	1	1	4
Private transport planners (contracted by master-planning developers)	1	0	1	2
Other (public sector, including police)	0	0	3	3
<b>Total</b>	<b>16</b>	<b>9</b>	<b>15</b>	<b>40</b>

Table II: Problem and solution evidence interview quotes

Many types of 'evidence'	"I think when we talk about evidence, I'm talking of a scale between anecdotal through to your proper published papers" – Public health practitioner
Evidence of a problem – needs assessment beyond health	<p>"Air quality and congestion may be something that you could use more in terms of motivating them [politicians] to think a bit more differently in terms of modal shift, but I think the [physical] activity argument and the rest of it, I don't think that is as powerful to local councillors as the air quality issues are." – LA urban planner</p> <p>"some [councillors] really need a very clear picture at a local level, before they'll decide that it's something they should be challenging the status quo on." – LA urban planner</p>
Evidence for a solution – knowing what works	<p>"I know there's a lot of research and data being shared around that, that we're sort of desperate to get our hands on really because of probably things that we can be doing on that, I sort of think sometimes health, is in danger of seeing itself as a sector that stays within its sector, rather than being part of transport and lifestyles and greenspace and built form and everything." – Private urban planner</p> <p>"I don't think I am supplied, generally speaking, with as much evidence as I would like... recently there was the BMJ article, wasn't there, on the health benefits of cycling earlier this year which I've been quoting very widely... I would like a bit more ammunition that I could use because cycleways you see are really really controversial, many motorists and of course most councillors are motorists, feel that cyclists get far too much money spent on them... it's actually sometimes quite a struggle to persuade your colleagues that actually active modes deserve priority over road traffic" – Councillor</p>
Retrospective evidence - justifying solutions already made	"if we need to justify the fact that we do spend quite a lot of money on greenspace we always feel quite comfortable that you can justify it because we have created an attractive space and actually the value of the homes is more than a development where you don't have a nice space around it ... (and) the more you can do by cutting down trips by the way you design a place, and investing in public transport, then you do reduce your big spend on big bits of road... I don't think that is a driver, but it's a way we then look to justify if anyone questions us as to why we're spending a lot of money on active neighbourhoods..." Private urban planner
Limitations of evidence	<p>"what we're effectively doing is spending a lot of public money on the basis of a hunch here and a good idea there. Quite often things can be a good idea in one context, I think this is another thing that doesn't go on, which is actually contextualising the situation properly" – Private urban planner</p> <p>"I think planning's notorious, I mean the planning system can get you information on how many houses are built and whether they're occupied and whether the infrastructure that developers have to deliver is in, like have they built their roads ...? Planning doesn't, planning kind of falls away a bit in terms of effectiveness when you're into places actually being used and lived in by people" - LA Urban planner</p> <p>"if there is an example where it's worked previously or it's showing benefits and you can take any sceptic sort of person along and say, 'Look, this is what we're going to do here' or you show a photograph of it, most people would be fine with</p>

	<p>that, but if, I think there is a reluctance to be the first to try something out in some ways” – Greenspaces stakeholder</p> <p>“while I’m often told to look at what the Netherlands are doing and why can’t we do that here, that’s not really much help... local evidence is better, if there were more of it it would be helpful” - Councillor</p> <p>“enlightened members will care if it saves the NHS money, but many will say, “Well, that’s got nothing to do with us, that’s not part of our responsibility.”” – LA urban planner</p>
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Table III: Power and relationships interview quotes

Influential individuals	<p>“For me, the data and evidence part is important but it’s also shaping it in the context of what the outcomes are for the other areas and departments and seeing it in that context as well and a lot of it is about building up the right relationships with the right people to be able to influence those developments and areas and programmes of work as well” - Public health practitioner</p> <p>“You wouldn’t be able to achieve what we’ve achieved if you didn’t have people who were passionate about what they were doing and wanted to do things differently. I’ve worked in three local authorities and it’s quite easy for people to get into the tick box mentality. ... I think when you’ve got passionate people who are committed to achieving a positive change in communities, it makes a real difference and it doesn’t take a lot, it just takes a few people and they can have that ripple effect ... in terms of improving longer term public health outcomes.” LA urban planner</p> <p>“I am going into a meeting this afternoon with the promoters for [development], and I’m going to specifically ask them what are they doing in their master planning to allow for healthy lifestyles, so that’s something, me or the person who is in my [urban planning] job five years ago might not have asked specifically, and that is a direct result of public health coming into the councils ... But I have only got ... a little bit of understanding of all of the health outcomes that we might want to achieve....” LA urban planner</p> <p>“because there isn’t a rule book that says for a new development you need to do this, then it’s individual people that then can make a difference or not... what arguments are you willing to have with developers and with colleagues to an extent, you know, you don’t necessarily have a consensus within an organisation about what infrastructure’s needed, how it should be designed, what it should look like, how are people going to use it... ” – LA transport planner</p>
The value of early involvement	<p>“we are brought into it too late in the planning stage... I think if we were brought in at the stage earlier our options would be bigger, we’d have more options to do something innovative.” - Other</p> <p>“the ultimate aim should be that we shape the scheme earlier before it gets to application because once it’s got to application there’s only so much you can influence at that stage whereas when it’s in a design stage and in the pre-planning stage that’s where you have the greatest influence.” - Public health practitioner</p>
Limited by policies	<p>“[LA] Planning Teams, they can be very good enablers and they can be very supportive, but they’re only supportive if the local plan has the right policies in that they can then fight” – LA Urban planner</p> <p>“if you’re going to say that you want to shift the mode of travel to cycling and walking and have a real dramatic change, you’ve got to have a dramatic policy change to enable that to happen” - Public health practitioner</p> <p>“We are given parameters to work to, that’s what we work to. If we are going to go overboard and provide more than what is required, it’s because we think it adds more value to our bottom line, yeah, but otherwise we just stick to what we are told we need to do” – Private urban planner</p>

<p>Watering down good designs</p>	<p>“quite often some developers will make promises in an outline planning consent, but by the time it comes to delivering stuff on the ground other hidden costs have emerged, which they didn’t foresee, and then perhaps certain pieces of, you know, fairly important walk cycle infrastructure get watered down or removed...” - Private transport planner</p> <p>“it tends to be that Road Safety have the final say on everything, which isn’t always to the benefit of cycling and walking, and in actual fact sometimes to the disadvantage of cycling and walking, because we’ll have created a nice little shared use route to modern design standards and gives priority to cyclists and walkers and is all lovely and ideal, and perfect in a perfect world for active travel, and Road Safety come along and say, no you can’t do that, it’s dangerous... Road Safety trump every scheme, every time.” – LA transport planner</p>
<p>Not enough resources</p>	<p>“[LA] Planning Teams can be a barrier if they're under pressure, so if they're under pressure to get an application turned round in the eight weeks then all the 'nice to do' stuff that I want to see in, gets dropped, all the other bits and pieces that we would fight for becomes that much harder to fight for, so the Planning Team is key, because they're the ones that make the ultimate recommendations to the Planning Committee to approve or not approve... sometimes they get so bombarded with all the applications coming through they don't really have that time to sit down and do all the pre-app meetings and bring in everyone that needs to be.” – Public health practitioner</p> <p>“I’d like to work with [public health] more but I don’t seem to get an answer all the time... like most departments, they have restructured, reduced their services” – Cycling stakeholder</p> <p>“So, typically, you know, on a lot of developments we're involved with, there isn't a health person, in inverted commas, who you can speak to at a local authority to sort of say, "Well, how do you think this master plan is shaping up?" – Private urban planner</p>

Interview guide		
#	Main Questions	Possible follow-up/prompts
<b>Background to involvement and personal attitude to healthy infrastructure:</b>		
1	Can you outline <b>your role</b> ?	Can you describe how and when you are involved with planning or developing walking and cycling infrastructure and open spaces?  What type of developments are you normally involved with?
2	What is your view on the walking and cycling infrastructure, and open spaces, in this areas?	How <b>walkable</b> or <b>cycleable</b> are developments/ this development?  How do you feel about the amount and quality of <b>open space</b> ?  Why are there <b>differences</b> between different areas?
<b>Knowledge exchange and evidence influencing the decision-making process:</b>		
3	Can you tell me about the <b>sources of information, knowledge or data</b> that you use to help you make or influence decisions?	Where do you go for <b>information</b> ? What are the key <b>guidance documents</b> ?  How useful is evidence from <b>other settings</b> ? Is <b>National guidance</b> useful?  What other <b>evidence</b> is used to inform <b>decision-making</b> ?
4	What is your view of <b>economic analysis</b> for healthy infrastructure?	Is <b>cost effectiveness</b> useful?  Do you think savings to the <b>NHS</b> can influence infrastructure decisions?  Do you assess <b>value for money</b> ?  <i>Developer:</i> How can <b>viability</b> impact on levels of open space? Could it affect walking and cycling routes?
5	Do you do or use <b>monitoring</b> or <b>effectiveness</b> data for walking or cycling?	How <b>useful</b> is monitoring data?
6	What <b>other information</b> or <b>evidence</b> would be useful to you?	Are there times where your argument would have been strengthened by better information or evidence?
7	Can you tell me about your view of <b>HIAs</b> ?	What are the <b>benefits or problems</b> with HIA?  Can planning be <b>refused</b> on health grounds?
<b>Key stakeholders and their relationships</b>		
8	Who are the main <b>supporters and opponents</b> to planning healthy infrastructure?	Can you describe the type of working <b>relationship</b> between stakeholders (e.g. planners, public health, developers, councillors etc.). Are they <b>collaborative</b> ? <b>Silos</b> ?
9	What do you think is the <b>main driver</b> for building active infrastructure?	Congestion, cost, health, etc.?

10	What do you think is needed to help <b>you</b> to enable more healthy infrastructure to be built?	What <b>limits</b> your influence e.g. time, budget, silos, politics, interest, relevance etc.?
11	What do you think <b>motivates others</b> to support walkable and cycling developments?	e.g. Traffic, the economy, politics, congestion, safety, carbon footprint, air pollution, community cohesion, local economy, economic benefits etc.?
12	Do you feel encouraged to be <b>innovative</b> and try new approaches?	What <b>supports</b> or <b>inhibits</b> innovation and trying new things?  Can you comment on the level of influence by <b>central government</b> ?
<b>Drivers for change during the planning process</b>		
13	Can you explain to me <b>how and when changes can occur</b> in development plans, particularly related to active living infrastructure?	Do you have a recent <b>example</b> ?  <b>What happened and why?</b>  <b>Who</b> was involved?
<b>Changes in healthy planning over time</b>		
14	Have you seen any <b>changes</b> to how planning decisions account for health over the last few years, since public health moved into local authorities in 2013?	What other things have <b>influenced</b> how public health issues are considered in the last few years?
Thank you very much for answering my questions. Is there anything else that you would like to say on this topic? <b>Comments? Feedback?</b>		

## Consolidated criteria for reporting qualitative studies (COREQ): 32-item checklist

Developed from:

Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

**Manuscript entitled "Decision-making for active living infrastructure in new communities: a qualitative study in England"**

No. Item	Guide questions/description	Reported on Page #
<b>Domain 1: Research team and reflexivity</b>		
<i>Personal Characteristics</i>		
1. Interviewer/facilitator	Which author/s conducted the interview or focus group?	ALG conducted the participant interviews. Page 4
2. Credentials	What were the researcher's credentials? E.g. PhD, MD	ALG has MEng in Engineering, Economics & Management, MSc in Water Management.
3. Occupation	What was their occupation at the time of the study?	ALG was PhD student at CEDAR.
4. Gender	Was the researcher male or female?	ALG is female.
5. Experience and training	What experience or training did the researcher have?	ALG has training in interviewing and data analysis; she was supervised by CG [as well as DO and LF] who has over 10 years of extensive research experience and teaches qualitative research methods
<i>Relationship with participants</i>		
6. Relationship established	Was a relationship established prior to study commencement?	Some participants were involved in the scoping discussions with ALG prior to interview. She met some other interview participants at one of the events where ethnographic observation occurred, prior to interview. Page 4



7. Participant knowledge of the interviewer	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	Some information was provided in Participant Information Sheets outlining the purpose of the study and introducing ALG.
8. Interviewer characteristics	What characteristics were reported about the interviewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	Limitations are included in the discussion section including ALG's background and the varied sectors that participants came from. Page 10
<b>Domain 2: study design</b>		
<i>Theoretical framework</i>		
9. Methodological orientation and Theory	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	A qualitative pragmatic study using thematic content analysis to explore experiences of decision-making. Page 5
<i>Participant selection</i>		
10. Sampling	How were participants selected? e.g. purposive, convenience, consecutive, snowball	Snowball sampling of key stakeholders in purposively selected local government areas. Page 4
11. Method of approach	How were participants approached? e.g. face-to-face, telephone, mail, email	Potential participants were approached by email by ALG. Page 4
12. Sample size	How many participants were in the study?	40 interview participants. Page 4
13. Non-participation	How many people refused to participate or dropped out? Reasons?	Potential participants were invited by email. Some did not reply and no reason was given.
<i>Setting</i>		
14. Setting of data collection	Where was the data collected? e.g. home, clinic, workplace	Study participants' offices (55%); ALG's office (8%); public café (5%); Telephone (33%). Page 4
15. Presence of non-participants	Was anyone else present besides the participants and researchers?	No one else present.
16. Description of sample	What are the important characteristics of the sample? e.g. demographic data, date	Sample characteristics are described in table 1.
<i>Data collection</i>		
17. Interview guide	Were questions, prompts, guides provided by the authors? Was it pilot tested?	Interview guide provided in supplementary material. Piloted and

		minor edits made. Page 4
18. Repeat interviews	Were repeat interviews carried out? If yes, how many?	No repeat interviews.
19. Audio/visual recording	Did the research use audio or visual recording to collect the data?	Audio-recordings of interviews for all except one. Page 4
20. Field notes	Were field notes made during and/or after the interview or focus group?	Brief notes were taken during the audio-recorded interviews; notes made for the non-recorded interview; field notes made for ethnographic observation. Page 4/5
21. Duration	What was the duration of the interviews or focus group?	Interviews lasted an average of 51 minutes each (range 21 – 97 minutes). Page 4
22. Data saturation	Was data saturation discussed?	Saturation was not sought for this study as it focussed on key stakeholders in purposively selected areas.
23. Transcripts returned	Were transcripts returned to participants for comment and/or correction?	This was not routinely done, however one participant requested to have their transcript returned. They did not provide any feedback.
<b>Domain 3: analysis and findings</b>		
<i>Data analysis</i>		
24. Number of data coders	How many data coders coded the data?	ALG coded all data; CG coded two interviews independently. Page 5
25. Description of the coding tree	Did authors provide a description of the coding tree?	Corresponding author can be contacted for the coding tree.
26. Derivation of themes	Were themes identified in advance or derived from the data?	Coding was directed by research objectives but themes derived inductively from the data. Page 5
27. Software	What software, if applicable, was used to manage the data?	NVivo 12. Page 5
28. Participant checking	Did participants provide feedback on the findings?	No, although this is planned for future research
<i>Reporting</i>		

29. Quotations presented	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	Quotations presented to illustrate the themes in tables 2 and 3. Participants identified by their role.
30. Data and findings consistent	Was there consistency between the data presented and the findings?	Yes, there is consistency between data and the findings.
31. Clarity of major themes	Were major themes clearly presented in the findings?	Yes, major themes are clearly presented in the findings.
32. Clarity of minor themes	Is there a description of diverse cases or discussion of minor themes?	Yes, minor themes and diverse cases were described and discussed where they occurred. e.g. Results, Page 5-8